



## MILITARY MEDICINE, COVID-19 AND THE CHANGING SCOPE OF OPERATIONS

October 1, 2020

Operational medical research seeks to develop biomedical countermeasures to prevent and treat injuries that might occur during military training or operations. Chaired by LCol Andrew Beckett, Trauma Advisor to the Surgeon General and Chief of General Surgery of the Canadian Armed Forces, this symposium highlighted the wide scope of operational medical research, including COVID-19.

Col (Retd) Homer Tien is a current reservist trauma surgeon, CIMVHR Fellow, and the Chief Executive Officer of ORNGE Transport Medical. Canadian Armed Forces (CAF) operations changed rapidly in response to the pandemic, like deployment to long-term care homes, leading to new health concerns for serving military personnel and their families. However, there are many similarities in the operational issues faced by CAF, hospitals, and emergency medical providers, like serving patients in different physical environments (land, sea and air), dealing with extremes of heat and cold, and atmospheric pressure. In addition, medical research has led to numerous innovations like optimizing the use of Personal Protective Equipment and the transport of highly contagious patients by air, as well as new standards of care worldwide in the areas of blood product transportation, blood transfusions, and the use of tourniquets to stop heavy bleeding.

Dr. Joanne Langley, Division Head of Infectious Disease and a Professor of Pediatrics, Community Health and Epidemiology at Dalhousie University, presented on mitigating COVID-19 through vaccination and provided a detailed update on the current science. Canada is part of a global process to gather vaccines for our citizens and lower-income countries through the COVAX international effort. SARS CoV-2 is an emerging infectious disease, one of many emerging and re-emerging diseases across the planet. After the 2006 SARS epidemic, International Health Regulations on infectious disease control were developed for the member countries of the World Health Organization (WHO). Public health measures are still key to infection prevention as vaccines are developed. Active vaccines are specific and create cell memory so the body can respond quickly when confronted with the same infection in future. It is the Spike protein of COVID-19 that impacts human cells, so vaccines are focused on this specific protein.

Dr. Michelle Sholzberg, Hematologist and Co-Investigator of the Canadian-led international RAPID COVID COAG Trial from St. Michael's Hospital, notes that in China, up to 70% of COVID-19 patients admitted to hospital had laboratory evidence of excessive bleeding due to reduced clot formation. This was due to elevated D-dimer, a protein fragment produced when a clot is dissolved in the body, leading to severe COVID-19 cases in need of critical care. If a patient receives a heparin dose in the early phase of COVID-19, the severity of the disease and death can be avoided by reducing lung inflammation. The use of heparin will likely lead to therapies that reduce the severity of COVID-19 infections. A biological link for African and Hispanic populations who are more prone to having elevated D-dimer was also discovered. A storehouse for biological samples now exists to enable international collaboration on blood-related trauma therapies.

Dr. Dana Devine, Chief Scientist at Canadian Blood Services and Professor of Pathology and Laboratory Medicine at the University of British Columbia, presented on current clinical trials around the use of convalescent plasma (CP) – the plasma of people who have recovered from COVID-19 – as a 'passive immunity' strategy. Infections lead the body to mount an immune defence response, creating antibody molecules. Antibodies are found in blood plasma and can be collected, so CP can be used as a source of antibodies to attack the virus in an ill person who cannot muster an adequate immune response on their own. Canadian clinical trials are underway using CP early on with moderately ill COVID-19 patients, with children, and with severely ill ICU patients with CP therapy as a last resort.

### TAKEAWAYS

#### THE FOLLOWING ARE ACTIONABLE ITEMS STEMMING FROM THE EXPERT PRESENTERS.

For **Research Funders**, the WHO has provided a vaccine target profile for pharmaceutical developers, stressing the ability to rapidly scale up production at an affordable cost per dose for broad use. In addition, the Canadian Immunization Research Network does pre-clinical evaluations before authorizing the use of a vaccine and continues to monitor the vaccine life cycle after roll-out. For example, biological sex is a risk factor, but the socioeconomic conditions of those living in racialized communities make it difficult to pinpoint. As trials roll out into programs, these issues will need to be studied and better understood.



For **Researchers**, in current clinical trials around convalescent plasma of people who have recovered from COVID-19, there is a sugar on the COVID-19 virus that resembles an A blood type. People with O blood types make antibodies against the A blood type group, which may, with more research, lead to novel treatment. O blood types report less rates of COVID-19 infection and disease severity, but there are too many confounders with current studies. This warrants further investigation.

For **Policy Makers**, Dr. Langley indicated it is uncertain whether a vaccine will provide indirect protection against COVID-19 – that the vaccine reduces the chance of infection beyond the vaccinated individual. Antibodies in infected patients are only present for a few weeks to a few months, so this could make vaccine development challenging and impede the goal of herd immunity because of short lived response and unknown effectiveness. Very high levels of vaccine uptake will be required to provide herd immunity, so continued public health protocols of masking, hand-washing and social distancing are essential.

For **Practitioners and Clinicians**, within eight hours of collecting COVID-19 convalescent plasma (CP), it is frozen and can be stored for 12 months. The 500 ml infusions are done at a slow rate over four hours and so far, there have been no cases of circulatory overload. In Canada, a physician can initiate a CP clinical trial license for one patient if that patient does not qualify for one of the ongoing clinical trials.

## THE WAY FORWARD

The Canadian Immunization Committee and the National Advisory Committee on Immunization (NACI) are developing the analytical framework for the immunization roll-out in Canada, including the safety and efficacy of vaccines and ethical and equity considerations. There is a military representative on NACI as the military is considered a special population subject to higher risk. Even once a vaccine is approved, education for healthcare providers will be needed, so they are confident in the product they are giving their patients with informed consent. Early trials have looked at solicited adverse events like pain at the vaccine site, which is transient, and small numbers of reported fever with vectored vaccines.

Convalescent plasma (CP) donors under 67 years of age with confirmed or presumptive positive COVID-19 who are male, or females who have never been pregnant, can register at [www.blood.ca](http://www.blood.ca) to determine if they meet the donor qualifications through a questionnaire. Studies on CP are large and need many participants. Recruitment has been slow, so Dr. Divine encouraged attendees to register if they have had COVID-19 or spread the word to their patients, families and friends who may have.